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# THEATOM

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Editor: Kenneth J. Johnson

Photography: Bill Jack Rodgers

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### COVER:

The cover photograph of honeybees on a honeycomb was taken by Bill Jack Rodgers of ISD-7. The bees and the honey they produce are routinely analyzed by members of Group H-8 in connection with an ecology survey being conducted at the Los Alamos Scientific Laboratory. For more detailed information, read the story beginning on page one. Tom Hakonson vacuums bees from a honeycombed wooden frame, held by Bill Pritchard, at one of LASL's liquid waste disposal sites.

# The Honeybee and Ecology



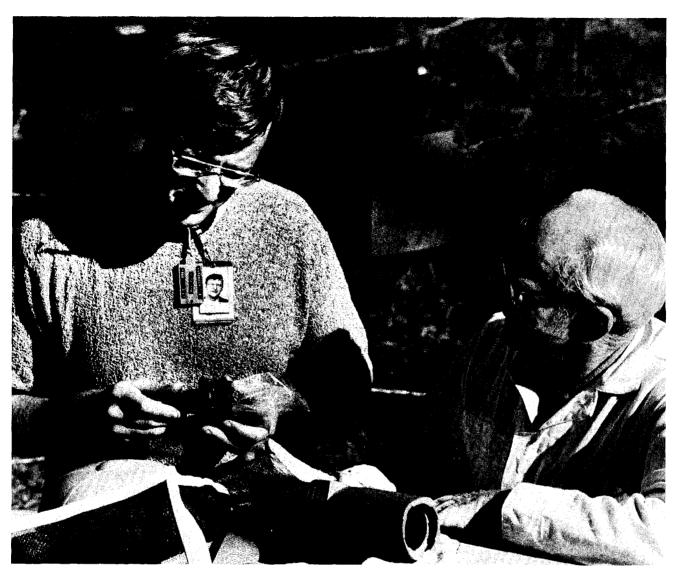
The honeybee, although sometimes feared because of its sting, is of inestimable value to both man and his environment. Since earliest times, the honey produced by the bee has been a major sweetening agent, and, many plants, especially those that flower, are completely dependent upon pollination by the bee for survival.

Now the honeybee has become a participant in a study at the Los Alamos Scientific Laboratory to determine the ecological behavior of industrial wastes. Hives of honeybees have been located in liquid waste disposal areas where the insects are continuing to do what nature intended them to do—produce honey and pollinate the plant life.

Some bees and honey are collected routinely by members of Group II-8's Environmental Studies Section, headed by LaMar Johnson, to determine the kinds and amounts of contaminants that are taken up by the insects and passed on to the honey they produce. With highly sophisticated chemical techniques and sensitive instrumentation, H-8 scientists look for trace amounts of radiocontaminants such as plutonium, tritium, americium and cesium which evolve from nuclear research and development projects conducted at the Laboratory.

The study is a part of a long term ecological survey of waste disposal areas at Los Alamos, Funded by the Atomic Energy Commission's Division of Biomedical and Environmental Research, the survey complements similar investigations being conducted by other laboratories across the country to determine the behavior of various

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Hakonson secures an aerated plastic bag to the vacuum's nozzle. The plastic bags are used in the collection of bees for analysis. Pritchard, right, a former Laboratory employee, tends the bees and helps Hakonson with field work.

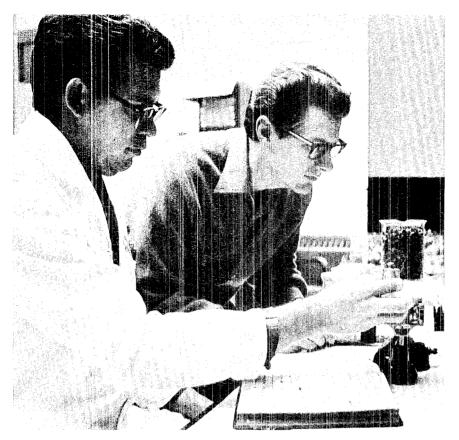
waste materials in areas inhabited by animal and plant life.

What makes Los Alamos attractive for such a survey is that the Laboratory has three liquid waste disposal areas of various ages, both active and inactive. Levels of radioactive contaminants present in these areas are easily dealt with because they are extremely low, well within the effluent concentration limits prescribed by the AEC for drinking water, and the areas abound with a variety of wild animal and plant life.

The idea of including bees in the survey was that of Tom Hakonson, a member of Johnson's section who now handles field and laboratory operations connected with this portion of the ecological survey.

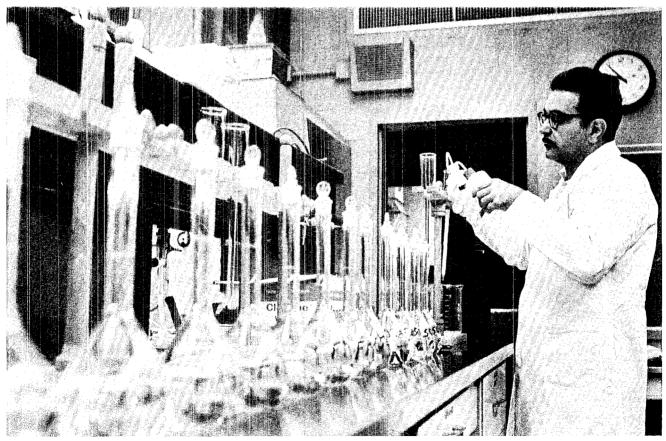
There is some evidence that bees might be an effective "indicator" of environmental radiocontamination in much the same way that canaries were indicators of "blackdamp" in coal mines before the development of safety lamps. According to Hakonson, the honeybee appears to be ideally suited for this type of ecology study because it is known to collect and concentrate radiocontaminants; it is a social insect that lives in colonies which makes sample collecting easy; it requires free drinking water which is present in the disposal areas; it forages as far as seven to eight

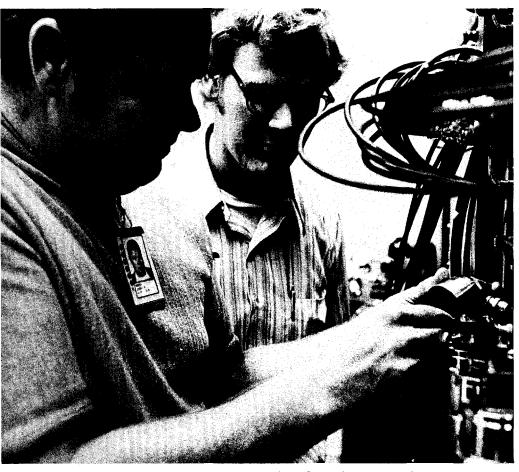
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Ken Bostic weighs a beaker of bees collected by Hakonson and Pritchard. Concentrations of radionuclides measured can then be correlated with unit weight. At right is LaMar Johnson, Environmental Studies Section leader.

Bee and honey samples are chemically prepared in H-8 laboratories. Here, Bill Schweitzer separates plutonium and americium from some of the samples.





Jim Owens and Stewart Lombard place a sample in a holder which is linked to an alpha ray spectrometer, used for isotopic analysis of plutonium and americium.

miles from its hive; some of the plant life it pollinates is food for living organisms; and the honey it produces is a part of the human food chain.

The bees are those of Bill Pritchard, a retired Laboratory employee who has been "keeping" bees as a hobby since 1964. Pritchard was a military staff member in Group CMB-11 from 1948 until 1954, and again from 1958 until 1960 when he retired from the U.S. Army with the rank of colonel. As a civilian, he was employed by the Laboratory and continued to work in CMB-11 until he retired a year ago.

Pritchard entered into a contract to provide Group H-8 with honey-bees for the survey. Under this agreement there are 15 hives, totalling more than a million bees. One hive has been located in each of the three liquid disposal areas. The other 12 hives are located together in a noncontaminated area. The

bees in these hives are used as "controls" for analytical comparison with bees located in the contaminated areas. They are also replacements in case a hive is destroyed, for example, by bears.

Each hive consists of five stacked wooden boxes, called "supers," which contain several honeycombed wooden frames where the bees store their honey.

Pritchard tends the hives and he helps Hakonson with routine bee and honey collections for laboratory radionuclide analysis. Collections are made every seven to 10 days. On warm days the bees are more active than on cold days and have occasionally been "smoked" with a small smoke generator. This pacifies them and reduces the chance that either of the two men will be stung. In addition, Hakonson and Pritchard wear thick, arm-length gloves and face nets when making the collections.

Bees are collected by vacuuming

them from the wooden frames with a small commercially manufactured car vacuum cleaner which is plugged into a vehicle's cigarette lighter receptacle or connected to its battery. By using small, aerated plastic bags instead of the cloth bag recommended for the vacuum cleaner, the scientists are able to take several samples without cross-contaminating any of them.

The two men also take out one of the wooden frames, one that they know has recently added honey.

In the H-8 laboratories, the bee and honey samples are chemically prepared and then analyzed for concentrations of radiocontaminants with alpha, beta and gamma ray spectrometers. The energies of the alpha, beta or gamma particles emitted by a sample are indicative of specific isotopes. The number of particles emitted is an indication of the amount of an isotope contained in the sample.

"This is part of a long term study," Johnson said. "We're interested in the dynamics of the interaction between waste materials and the environment. The information we generate should have applications at other installations like Los Alamos and also at nuclear power generating stations."

# Interplanetary Monitoring Platform Carries LASL Plasma Experiment



Sam Bame and Jack Asbridge discuss plans for future plasma experiments. Bame holds a cross section of a plasma experiment built for a Vela satellite.

The largest and most complex satellite of the Interplanetary Monitoring Platform (IMP) series swings around Earth every 13 days. The spacecraft, launched Sept. 22, carries 13 scientific experiments designed to extend man's knowledge of solar-lunar-terrestrial relationships.

One of these is a plasma experiment designed by P-4 scientists at the Los Alamos Scientific Laboratory to obtain measurements that will help to provide more complete descriptions of the solar wind and magnetosphere.

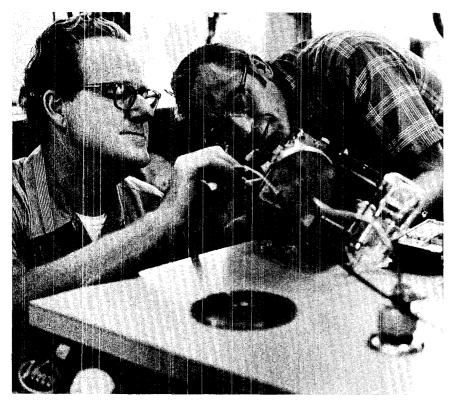
A plasma is an ionized gas consisting of free ions and electrons and which, as a whole, is neutral. The solar plasma through which the satellite orbits is a constant stream of charged particles, traveling at supersonic speeds, that are emitted by the Sun. It is made up primarily of electrons and protons which impinge upon Earth's magnetosphere in about equal numbers.

The stream of solar plasma striking the magnetosphere, an enormous tear-drop shaped envelope which surrounds the Earth, tends to compress the magnetic field on the side toward the Sun and distends the tail, or the side away from the Sun, to a distance of millions of miles. The shape of the field appears comet-like, giving the entire magnetosphere an aerodynamic form.

During periods of maximum solar activity, in the 11-year cyclic period of the Sun, the stream of solar plasma increases greatly. This brings about disruptive effects on short wave communications and undersea communication cables.

There is also a cycle of about 27 days corresponding to the rotation

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Harry Felthauser and Asbridge prepare to leak test a plasma apparatus being readied for a Mariner satellite that will perfom a flyby mission of Venus and Mercury.

Paul Glore, Georgia Hall and Burt McCloud, members of E-Division's space electronics team, work on circuitry for an experiment being built for IMP-J which will be launched in early 1974.

of the middle portion of the Sun's surface. Charged particles and a lesser number of heavy atomic nuclei are expelled at tremendous speeds.

The IMP-borne LASL instrument, according to P-4's Sam Bame, principal investigator for the experiment, is capable of providing information on ion and electron populations, temperature, direction of flow and heat flux from the sun,

It consists of two metal hemispherical analyzers and an electron multiplier. By alternating voltages



between the two analyzers, particles entering apertures are bent to impinge on the electron multiplier which records the properties of either electrons or protons depending on which analyzer is turned on.

The amount of voltage on the analyzer determines the particle energy measured. Voltage is applied in bursts. At first, the instrument is sensitive to high-energy particles, but as the voltage decays it is sensitive to particles of correspondingly lower energies.

All parts of the instrument were

built at the Laboratory with the exception of the electron multiplier which was commercially manufactured. Voltage supplies, logics system and engineering support for the experiment are provided by Sandia Laboratories. "The Shop Department makes the parts for the experiment and members of P-4 assemble them," Bame said. "The amplifier for the electron multiplier is put together by Paul Glore's space electronics team in E-Division. The responses of the instrument are calibrated by Jack

Asbridge, Harry Felthauser, Glore and myself. Then, it is delivered to the project site at Goddard Space Flight Center in Greenbelt, Md. We, and people from Sandia, provide support during the test phase of the spacecraft. Data format and handling is the responsibility of Earl Tech with the assistance of Dottie Smith and other P-4 data analysts. Scientific analysis and interpretation of the data is carried out by Jack Asbridge, Bill Feldman, Gene Gilbert, Ed Hones, Mike Montgomery and myself."

The plasma experiment is an outgrowth of the successful Vela satellite program which was implemented to detect clandestine nuclear detonations on earth, in the atmosphere, in outer space, and to furnish information pertaining to the Sun and our universe.

The Laboratory's first IMP plasma experiment was launched in March, 1971, aboard a satellite designated IMP-I, "We were invited by NASA to propose an experiment because there was only one other plasma experiment on the satellite," said Bame. "Plasma experiments are basic because data from them is needed by other experiments."

During this mission, the LASL experiment has displayed some interesting scientific results. "One thing we found," Bame said, "that was totally unexpected, is that the solar wind sometimes splits into two different streams which flow together but at different speeds. We think this may be because the plasma does not flow uniformly. Since the plasma is collisionless, faster streams can sometimes overtake slower streams and merge with them.

"Another was the verification of a theory that particles in the solar wind sometimes reflect back from earth's magnetopause (the outer boundary of the magnetosphere). With our instrument, we've seen this phenomenon."

Two other scientific achievements were noted by Feldman. One of these is that with data from the





Working on data reduction from the IMP-H plasma experiment are Bill Feldman, Earl Tech, Dottie Smith and Pauline Stone.

experiment, a series of difficult equations (the Vlasov Equations) concerning the behavior of plasmas can now be resolved. The other is verification of a theory that following a solar flare, a magnetic bubble, containing hot plasma which subsequently cools, is sometimes isolated from the sun.

The most recently launched sat-

ellite is designated IMP-H and will be followed by IMP-J, the last launch of the series. IMP-J will be lofted into space in early 1974 with the LASL plasma instrument aboard. "The experiment will be identical to that on IMP-H," Bame said, "with the exception that its operation cycle will be changed because the spin rate of IMP-J is half

that of IMP-H. If we didn't make this change the experiment would operate only half as fast and we would have a lot of redundant data."

In November of 1973, a plasma experiment carrying a LASL analyzer will be placed on a Mariner satellite which will perform a flyby mission of the planets Venus and Mercury. This experiment, a joint effort of scientists from LASL, MIT and the Goddard Spaceflight Center, will be similar to those on the IMP satellites. However, it will operate from a scanning platform covering an angular range of 120 degrees. "The IMP's have all been spinning satellites, Bame said. "The Mariner will not spin. It will be stationary, so our experiment has to mounted on a platform that will permit it to scan back and forth.

"Our Mariner mission is twofold: One is to study how characteristics of the solar wind change as we go closer to the Sun. Through this part of the mission we hope to be able to understand plasmas better. Second, we will study the interaction of the solar wind with the planets. Venus does not have a strong magnetic field like the earth, although it has an atmosphere and ionosphere like the earth which causes a bow shock. Mercury has an extremely thin atmosphere and most likely has no magnetic field, so there is probably no bow shock. The solar wind probably should interact with this planet like it interacts with the moon."

While high resolution data from the continuously operating LASL experiment is making significant contributions to extending man's solar, lunar and terrestrial knowledge, there are more earthly applications for it. According to Bame and Feldman, a better understanding of the behavior of plasmas in space is expected to be of value in the field of controlled thermonuclear (fusion) reactions where containment of very hot plasmas is a present focal point in the development of the next generation of power reactors.

## LASL Hosts

# Panel on Tactical Nuclear Warfare

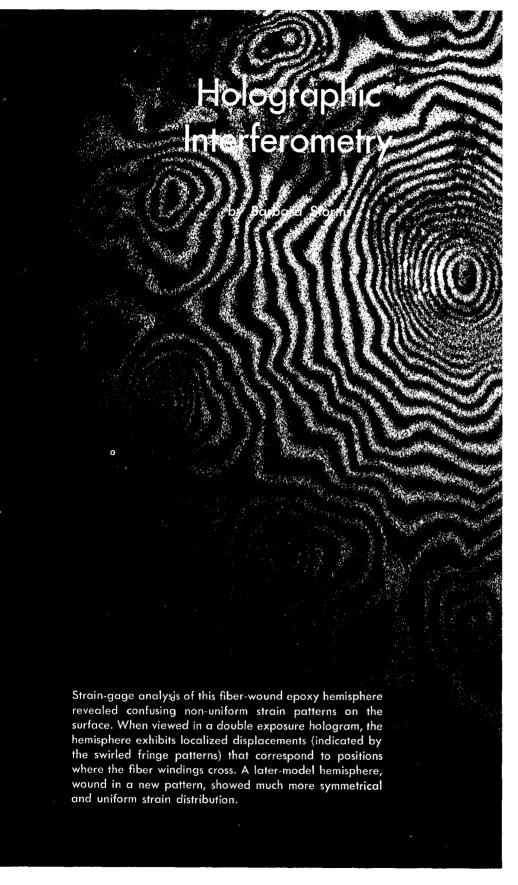


To improve understanding of U.S. requirement for development of tactical nuclear weapons, I.ASI. hosted a Panel on Tactical Nuclear Warfare consisting of several consultants and experts who talked on various aspects of the subject. Above, Robert Shreffler, Dir. Off., is shown addressing the panel members and other observers who attended the two-day meeting. Below, discussion continued during breaks in the meeting, in this photograph, among Milton Weiner, Rand Corporation, Santa Monica, Calif.; J. D. Douglass, Jr., Advanced Research Projects Agency, Arlington, Va.; Colonel Richard Sandoval, U.S. Army Combat Developments Command, Ft. Bliss, Texas; and Colonel Robert Duff, AEC's Division of International Security Affairs.





Panel members included Charles Hulburt, Computer Sciences Corporation, Falls Church, Va.; Samuel Cohen, Rand Corporation, Santa Monica, Calif.; and Seymour Weiss, Department of State Planning and Coordination Staff, Washington, D.C.



What does clear air turbulence look like? What do you see when two colorless gases collide? How do you visualize the invisible?

Jack Fullbright and Max Winkler of M-l have found answers to these questions with the development of holographic interferometry for study of the flow and turbulence of gases.

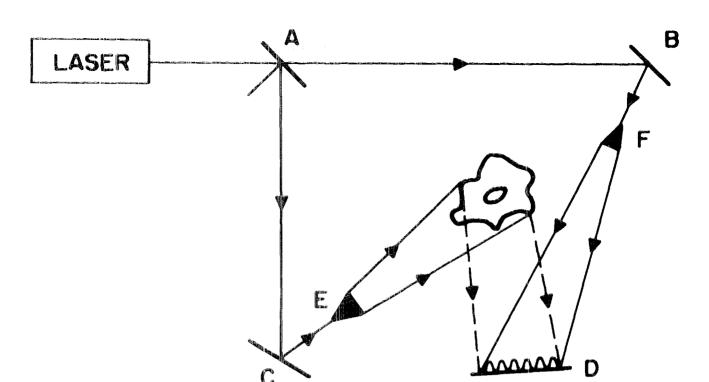
Although interferometry is a standard testing procedure, holography is relatively new and the combination of the two provides a new and significant addition to the nondestructive testing methods offered to the Laboratory by Group M-1. The method has proven equally valuable for measuring how structures change shape under effects of controlled stressing, thus pinpointing areas of materials where defects may exist.

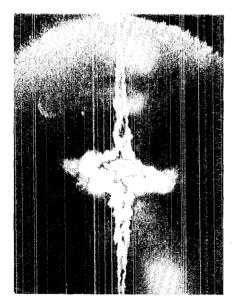
A hologram, named from the Greek words meaning "the whole message," is a three-dimensional image produced in fine detail with a laser light and without the use of lenses. The image can be viewed from many angles and looks exactly the same in size, appearance and three-dimensional characteristics as the original object. Even when portions of the plate are covered the complete image remains.

A laser beam, whose coherent light contains no pattern or "information," crosses a reflected beam (the object light) which has been highly patterned by the material from which it is reflected. The interference pattern that results contains complete information about the object. This information is then recorded on a specially treated photographic plate. When re-illuminated by a laser beam the hologram appears precisely the same as the original scene.

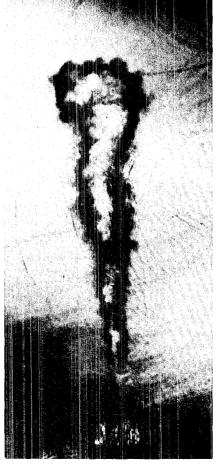
The introduction of interferometry permits the observation and measurement of changes in shape of the object resulting from stress, or changes in optical path lengths

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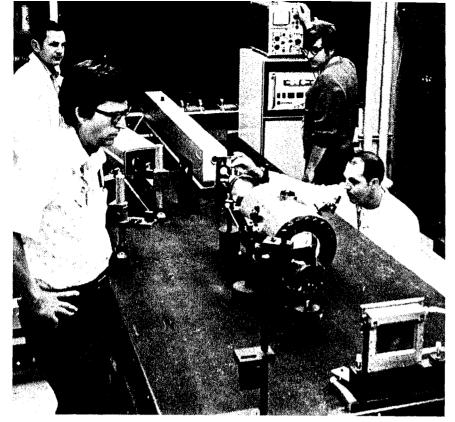


Above, double exposure hologram clearly shows the collision of two jets of neon gas in a pressure vessel containing nitrogen. The first exposure was made under static conditions and the second came 25 milliseconds after the valve was opened. View was through quartz windows 12 centimeters thick. Pulsed ruby laser was used for illumination.



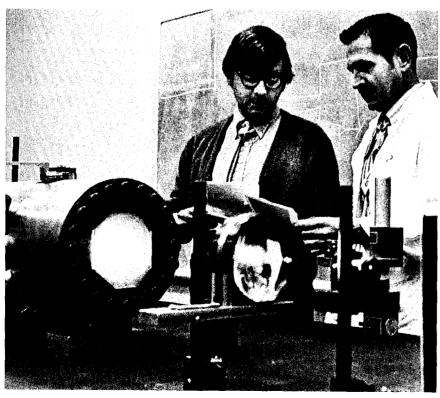
Drawing, showing the layout of components illustrates a technique for obtaining two wave trains that are coherent with each other. Laser output is directed through a variable beam splitter at A. The beam splitter divides the incoming beam into two paths. part continuing to the film by way of mirror B. The reflected portion of the beam is diverted to the film by way of mirror C and the object. The wave train along path ABD constitutes the reference beam and that along ACD is the object beam. Components E and F are spatial filters that filter and expand the wave fronts. If the amplitude and phase of the two wave fronts remain constant for a suitable length of time, the interference pattern can be recorded on a high resolution photographic plate at D. The developed plate is the resulting hologram of the object or of its wave form.

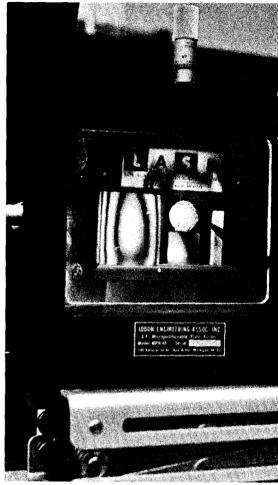
Left, double exposure hologram shows the behavior of nitrogen gas as it exits from a nozzle into the atmosphere. The initial exposure was made under static conditions. Second exposure was 12 milliseconds after the valve was opened. Illumination was provided by a pulsed ruby laser.



Neal Lundgaard, foreground, Max Winkler, Jack Fullbright and Roland Hagan prepare to make an interference hologram of gas flow.

Fullbright and Winkler check Polaroid pictures of holograms made in gas flow studies. Pressure chamber for gas, left, faces a spatial filter that filters and expands the wave fronts entering the gas chamber.





Interference patterns viewed in a double-exposure, image-plane hologram show how a golf ball and an aluminum cylinder behave while shrinking. Shrinkage results when objects are warmed by a heat lamp and allowed to cool.



resulting from changes in density or refractive index of a fluid. This is accomplished by looking at the materal twice: either by double exposure holography or by simply comparing the holographic image made while the material is in its undisturbed state with the real-time image of the object under stress. Stress can be applied by pressure, heat or vibration.

In a double exposure hologram, the film is exposed while the object is in its stationary or unstressed state and exposed again during movement or stress. The resulting interference pattern, which indicates the changes that have taken place, is "frozen" in the hologram and can be reconstructed at any time for photographing or for observation.

To apply the method to the study of gases, Fullbright and Winkler have squirted colorless gas, such as helium, nitrogen, neon, or argon, into a transparent pressure chamber positioned in the object beam so that the beam passes through the area of interest. The film is exposed while the chamber is undisturbed and the image on the hologram remains unchanged until gas is injected through nozzles into the chamber. As the gas leaves the nozzles, the flow is easily visible so that the gas front velocity, size and shape of the gas fronts, the amount of gas entrapped and the dynamic behavior of the gases as they collide are all seen in contrast to the original background.

Activity in the chamber is recorded for future diagnosis through the hologram at framing rates up to 4,000 pictures per second. Holographic exposures can be made at intervals of one microsecond with the use of a double-pulsed ruby laser.

"In other words," Fullbright said, "if we make an exposure every time the beam pulses we'll be getting a million exposures per second."

Fullbright and Winkler admit to some limitations of their new method. At present the technique is qualitative only—it locates the problem—but efforts are currently being made to find ways to treat the data mathematically in order to extract information for more thorough analysis. In additon, unless the material, like gas, is transparent, movement and stress can be seen only on the surface. "We just can't see what's going on inside,' Fullbright said.

One of the prime advantages of the system is that no fancy optics are necessary. The more conventional Schlieren method, which provides similar data by means of an optical diffraction technique, requires perfect optics. To perform the same gas flow studies under very high pressures, expensive, strain-free optical windows would be required in the pressure chamber. Even so, changes in pressure would cause additional strains which would obliterate the data.

"The fact that we obtain our gas data through roughly machined Lucite windows five centimeters thick, demonstrates the character of this method," Fullbright said. He added that holographic interferometry is one of the few diagnostic test methods that is non-contacting and thus avoids any perturbations that might result from touching the material.

Fullbright and Winkler feel the potential for using the new method are boundless. It is not only flexible and adaptable to almost any material for almost any purpose, the system is also portable enough for use anywhere in the Laboratory. But beyond meeting the diagnostic needs within the Laboratory, the scientists foresee the potential use of holographic interferometry for studying such major problems as clear air turbulence and the reduction of jet engine noise.

# **Photo Shorts**

by Bill Jack Rodgers





Alexander Prokhorov, a leading Soviet physicist and 1964 nobel prize winner in laser development, was a recent visitor at the Laboratory. He is shown here touring LASL laser facilities, with L-1 Group Leader Charles Fenstermacher, left, and L-Division Leader Keith Boyer, right.

Above, a female coyote is a regular lunch partner of Jerry Damitz, Jim Young and Dick Johnston, all of L-3. Dubbed "Maxie," the coyote eats food scraps thrown to her by the three men.

Below, Harold Agnew, director of the Los Alamos Scientific Laboratory, talks with Vice Admiral Kent Lee, and Vice Admiral Jerome King, Jr. King, director of operations, Joint Chiefs of Staff, and Lee, deputy director, Joint Strategic Target Planning Staff, were key U.S. Navy officials attending the recent Navy Nuclear Weapons Safety Symposium held at LASL.



WX-Division Leader Eugene Eyster shakes hands with General John Meyer, Commander in Chief of the Strategic Air Command and Director of the Joint Strategic Target Planning Staff, during a recent visit to the Laboratory by the General and his staff. To Eyster's left are Les Luehring, WX-3; Karl Esch, ADWP-1; Richard Baker, CMB-Division Leader; and USAF Lieutenant Colonel Bob Bowles, Defense Nuclear Agency.



At the North Port Target station of LAMPF, Bill Daniels and Carl Orth insert target material into the 100-MeV beam line in a specially designed target facility. Target consists of foil of uranium-238 sandwiched between aluminum foil.

# LASL Scientists Discover Thorium-236

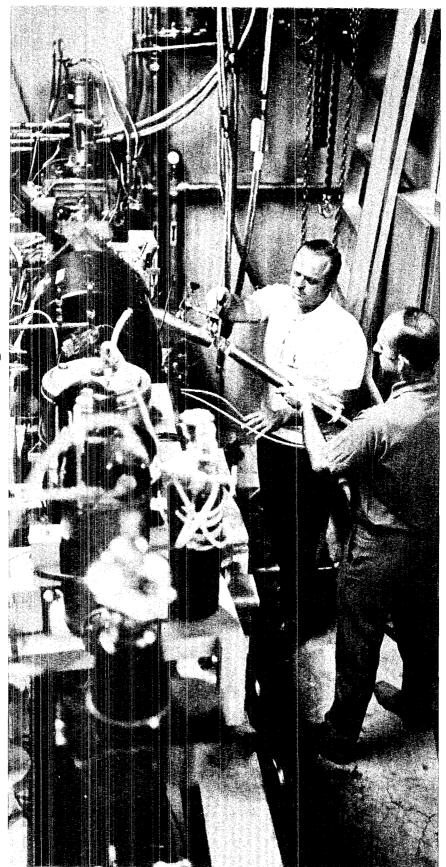
It was elusive and it was scarce. but there was no doubt about it.

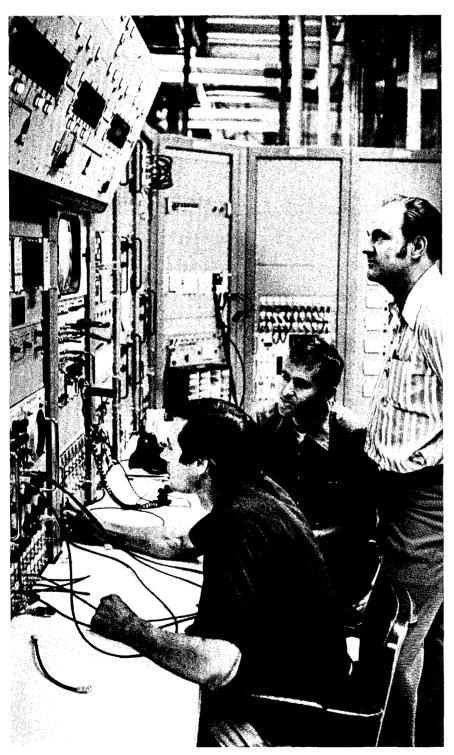
The heaviest known isotope of thorium, thorium-236, was discovered Sept. 25 as a result of the first scientific experiment performed at the Clinton P. Anderson Los Alamos Meson Physics Facility. The experiment has since been repeated a number of times with identical results.

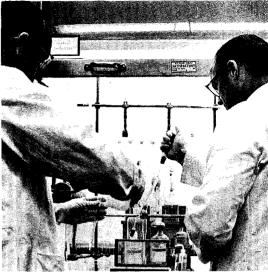
Using the North Port target station, Carl Orth, Bill Daniels and Bruce Dropesky, all of CNC-11, irradiated a foil of uranium-238 with 100-MeV protons from the second stage, or Alvarez unit, of the LAMPF accelerator. After a twenty-minute bombardment, the target material was put through an extensive ion-exchange procedure which chemically separated and purified the thorium fraction from large amounts of fission products.

The neutron-rich isotope was produced by a (p,3p) reaction—one proton in, three protons out—but the chances that this reaction

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Thorium fraction resulting from proton bombardment is separated and purified in an elaborate ion exchange procedure by Carl Orth and Bill Daniels. Chemists must move fast to complete procedure in time to catch discernible amounts of the short lived isotope, thorium-236.

At the control panel from which the beam for the first scientific experiment at LAMPF was initiated are Ted Newlin, MP-2, Mike Paciotti, MP-3, and Seth Rislove, MP-2. would work so well on such a heavy target element were small.

"Getting one proton in is no trick," the scientists explained, "but giving up several protons is one of the last things the uranium wants to do."

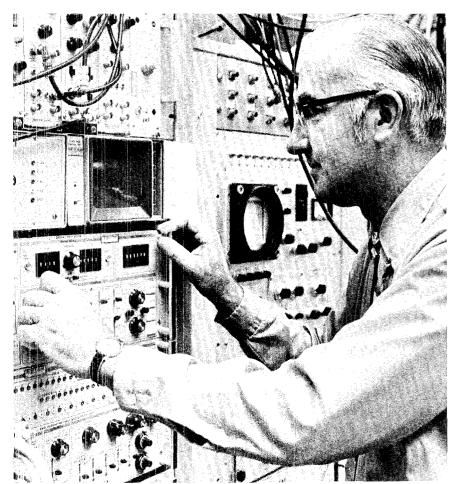
But work it did, although the cross section is small. "Our chemistry had to pull thorium-236 out of a vast number of fission products," Dropesky said. "There are about one million times more atoms that we don't want." He said the situation is rather favorable for observing this low yield species in the presence of lighter thorium isotopes because of the variations in gamma ray energies and half lives.

Thorium-236 is identified and distinguished from six other isotopes in the thorium fraction by observing three high intensity gamma rays known to be associated with the decay of its daughter protactinium-236. The gamma rays are measured by high resolution spectroscopy as protactinium-236, with its half life of nine minutes, grows into equilibrium with the parent thorium isotope. Thorium-236 has a 39minute half life and appears to decay predominantly by direct beta transition to the protactinium-236 ground state.

"We haven't yet observed radiations of the thorium itself to excited states of protactinium," Orth said, "but we're looking."

Because of the short life span of the isotope, the investigators have to move fast. Once bombardment is completed the sample must be removed from the target facility and rushed in a lead "pig" to the chemistry lab at TA-48. This takes 20 minutes. The elaborate chemical procedure, involving the use of four ion exchange columns, takes another 80 minutes. By then about 80 per cent of the isotope has decayed.

"But we always manage to come up with enough to look at," Daniels said. He added that they hope to improve the purification procedures as the experimental work progresses.



Watching for signs of gamma rays that characterize the presence of the new isotope is Bruce Dropesky.

Work on the experiment began several months ago when Louis Rosen, MP-Division leader, suggested that during the early testing period, the proton beam from the LAMPF accelerator could be used occasionally for nuclear chemistry activation experiments. Because the 100-MeV output of the drift tube portion of the three-stage accelerator offers nearly ideal energy for production of neutron-rich isotopes, the chemists were quick to accept the offer. Over the past couple of months a target facility was built and the chemistry was developed in detail. The chemists claim no particular innovations in the experiment. "We just adapted existing techniques to the specific problem," they said.

"This group is to be heartily congratulated for being so clever and

so successful on their very first try," Rosen said.

The scientists give special credit to members of MP-Division who made the cooperative effort possible: to Don Hagerman, chief of operations for LAMPF, Bob Warner, Seth Rislove, and Bob Hill of MP-2, the accelerator operations group; to Tom Putnam, MP safety officer, and to Mike Paciotti, MP-3. Dropesky said, "We are particularly grateful to Paciotti for his tireless efforts and skill in delivering the beam to our targets."

This experiment is part of a series of preliminary studies in preparation for a broad-based nuclear chemistry program which is planned to begin in April at LAMPF. These studies will also provide the ground work for isotope production proposed for the meson facility.

# The World's Smallest Workshop

George Perrault has a home workshop that would be the envy of anyone who has ever aspired to be a machinist, but he's never used any of his tools to build anything.

The reason is that his tools are all miniature, so small that Perrault can probably be said to have the world's smallest workshop. To him, making tiny tools is a hobby, and he makes them in such detail that they actually work.

Perrault, in addition to being a home-styled clock maker and taxidermist, has been adding both power and hand tools to his collection since 1957. "I was working for William Ainsworth, Inc., in Denver at the time. We played cards during the lunch hour, but that got old after a while so I started making miniature tools. The first thing I made was a tiny vise. Of the tools I have now, about a third of them were made while I was living in

Denver. I made the rest of them after I came to Los Alamos three years ago,"

Perrault, E-DO, works on balances at the Los Alamos Scientific Laboratory. He makes small tools of wood, brass, aluminum and steel during his leisure hours at home where he has two metal lathes, one of which is equipped with a milling machine-drill press combination.

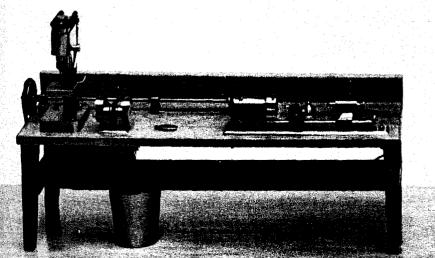
His workshop collection includes three power tools—a drill press, metal lathe and grinder—which are all operated by a small slot-car motor. Hand tools he has made, none of which approach the size of a paper match, include a micrometer, calipers, oil can, lathe chuck, box and open-end wrenches, a carpenter's square, pliers, hack-saw, clamp, wood mallet, hammer, pipe and crescent wrenches, magnifying glass, screwdrivers, tinsnips, handsaw, files, dustpan and foxtail.

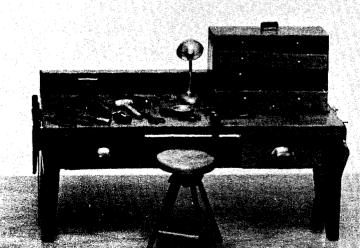
Other miscellaneous items, likely to be found in a home workshop, are an ashtray, wastebasket and desk lamp.

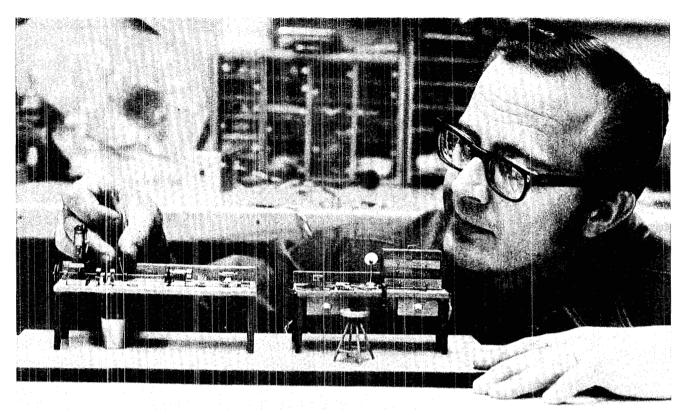
To display his minature collection Perrault built two small workbenches, one for power tools and the other for hand tools, complete with a wooden, adjustable stool and a tool box.

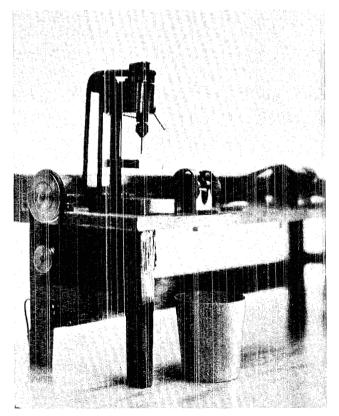
The LASL employee said it takes an average of about two and a half hours to make a hand tool. The time it takes to build power tools is not as easily averaged, he said. "I built the lathe in 16 hours."

Perrault plans to keep adding to his collection. Future additions, he said, will include some more electrically powered tools including a belt sander and a floor-model milling machine. He also plans to build a "man" to work in the shop. T'll set him on the stool, put a motor in him and have him sawing or filing something in the vise."



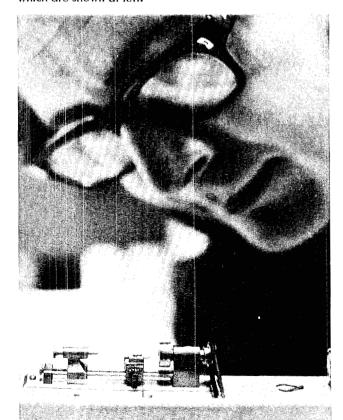






George Perrault, E-DO, displays his miniature workshop. The object held between his thumb and forefinger is an oil can.

Below, this metal lathe is one of three tools powered by a slot-car motor. The others are a grinder and a drill press which are shown at left.



# S. Sweet Named to Succeed B. West As Head of Accounting Department







Sherman Sweet

Sherman Sweet has been named to head LASL's Accounting Department, succeeding Boyd West who has held the position since 1959.

Sweet, whose appointment was effective Oct 1, has been employed by the Laboratory since 1951. He was named a senior accountant in 1952; assistant group leader in 1953; alternate group leader in 1956; administrative assistant in 1958 and alternate department head in 1960.

West has announced his intention to retire before July. Sweet's appointment was made at this time in order to provide a smooth transition in administrative functions. West has been appointed senior accounting advisor until his retirement.

West joined the Laboratory in 1947 as an administrative assistant in the Business Office. He was named group leader of AO-3 in 1950; administrative assistant in the Accounting Department Office in 1955; alternate Accounting Department head later that year and department head in 1959.

A meritorious service medal was presented to Thomas Dowler, ADWP-2, by Vice Admiral Kent Lee, deputy director of the Joint Strategic Target Planning Staff. The medal was presented in connection with his outstanding contributions as a member of the JSTPS. He was then U.S. Army Lieutenant Colonel Dowler. He retired from the military only recently and is now a staff member at LASL. At left is Dowler's wife, Joanne.



# the technical side

Taken from LASL Technical Information Reports submitted through ISD-6

Sixth International Cyclotron Conference, Vancouver, British Columbia, July 18-21:

"A New Beam Spill Control System for LAMPF" by J. R. Parker, MP-1

International Summer School Devoted to Nuclear Physics, Rudziska, Masuria, Poland, Aug. 21—Sept. 1:

"Theory of Nuclear Fission and Superheavy Nuclei" by J. R. Nix, T-9

Ninth International Congress of Crystallography, Kyoto, Japan, Aug. 26-Sept. 6:

"The Phase Transitions and Crystal Structures of Deuterium" by A. F. Schuch, R. L. Mills, both P-8, and J. L. Yarnell, P-2

"Crystallographic Computing Developments in North America" by A. C. Larson, CMB-5 (invited)

"Re-examination of the Crystal Structure  $B_4C$ " by A. C. Larson and D. T. Cromer, both CMB-5

Symposium on Nan-Proton NMR in Inorganic Chemistry, American Chemical Society Meeting, New York City, Aug. 28—Sept. 1:

"Nitrogen-15 NMR As a Tool for Studying Intermolecular Interactions and Dynamic Processes in Liquids" by M. Alei, Jr., CNC-2 (invited)

"Oxygen-17 NMR of First Transition and Lanthanide Series Complex Ions" by A. H. Zeltmann, CNC-2 (invited)

Conference on Few Particle Problems in the Nuclear Interaction, University of California, Los Angeles, Aug. 28-Sept. 1:

"Research on Few Particle Systems at LAMPF" by J. E. Simmons, P-DOR (invited)

"Polarization Experiments and Few Nucleon Systems" by G. G. Ohlsen, P-DOR (invited)

"Preliminary Measurements of Polarization Transfer in Helium-4 (Deuteron, Deuteron)-Helium-4 Elastic Scattering" by G. C. Salzman, G. G. Ohlsen, C. K. Mitchell, all P-DOR, W. Gruebler, Swiss Federal institute of Technology, Zurich, and W. G. Simon, University of Wyoming, Laramie

"Analyzing Powers in the Helium-3(Deuteron, Proton)Helium-4 Reaction at Energies Less than 1.0 Million-Electron-Volts" by W. G. Simon, University of Wyoming, Laramie, C. K. Mitchell and G. G. Ohlsen, both P-DOR

Solar Terrestrial Relations Conference, University of Calgary, Alberta, Canada, Aug. 28-Sept. 1:

"Substorm Phenomena in the Distant Magnetosphere" by E. W. Hones, Jr., P-4

"Comments Relevant to the Magnetosphere, Aurora and Polar Cap" by E. W. Hones, Jr., P-4

Research Institute for Physics, Stockholm, Sweden, Sept. 4:

"Theory of Nuclear Fission" by J. R. Nix, T-9

Department of Physics, Technical University of Munich, Germany, Sept. 4:

"Ultralow Temperature Thermometry and Ferromagnetic Superconductors" by R. D. Taylor, P-8

Transuranium Elements Symposium, Moscow, USSR, Sept. 4-8:

"'Calculational Chemistry' of the Superheavy Elements" by R. A. Penneman, CNC-4, and J. B. Mann, T-4 (invited)

"The Elucidation of Actinide Fluoride Structures Using Single Crystal X-Ray and Optical Microscopy Tochniques" by R. A. Penneman and R. R. Ryan, both CNC-4 (invited)

Symposium, 100th Anniversary of the Boltzmann Equation, Vienna, Austria, Sept. 4-8:

"A Review of Computer Studies in the Kinetic Theory of Fluids" by W. W. Wood, M-DO Computer Science Department, University of Waterloo, Ontario, Canada, Sept. 5; and Computer Science Department, Yale University, New Haven, Conn., Sept. 12:

"The Numerical Solution of a Parabolic Free Boundary Problem" by F. W. Dorr, C-4 (invited)

Royal Institute of Technology, Stockholm, Sweden, Sept. 5:

"Superheavy Nuclei" by J. R. Nix, T-9

Jozef Stefan Institute, Ljubljana, Yugoslavia, Sept. 6:

"NMR of Some Fluorides" by E. Fukushima, CNC-4 (invited)

Siemens Company, Erlangen, Germany, Sept. 6:

"Ferromagnetic Superconductors" by R. D. Taylor, P-8

Sixteenth International Conference on High Energy Physics, University of Chicago and National Accelerator Laboratory, Batavia, III., Sept. 6-13:

"Program of Neutrino Experiments at LAMPF" by L. Heller, T-5, and D. E. Nagle, MP-DO

Physics Institute of the University of Erlangen-Nurnberg, Erlangen, Germany, Sept. 7:

"Lattice Dynamics Studies Using Mossbauer Effect Impurities" by R. D. Taylor, P-8

Seminar, Laser Engineering Staff, Lawrence Livermore Laboratory, Calif., Sept. 8:

"Contemporary Capacitive Energy Storage Systems" by E. L. Kemp, P-16

Telefunken Company, Frankfurt Germany, Sept. 8:

"Superconducting Power Transmission Line Studies at LASL" by R. D. Taylor, P-8

Institute of Nuclear Physics, Orsay, France, Sept. 8:

"Predictions for Superheavy Nuclei" by J. R. Nix, T-9

Annual Meeting, American Cancer Society, New Mexico Division, Albuquerque, Sept. 9:

continued on next page

"Studying Pion Beams for Cancer Therapy" by C. Richman, H-4 (invited)

American Nuclear Society Topical Meeting, Applications of Californium-252, University of Texas, Austin, Sept. 11-13:

"252Cf Neutron Source Systems for the Assay of Uranium and Plutonium in Fuel Rods" by H. O. Menlove, A-1 (invited)

Conference on Flare-Produced Shock Waves in the Corona and Interplanetary Space, National Center for Atmospheric Research, Boulder, Colo., Sept. 11-14:

"Electron Characteristics of closed Magnetic Structures Following Some Interplanetary Shocks" by W. C. Feldman, J. Asbridge, S. Bame, and M. Montgomery, all P-4

Conference on Perspectives for Hyperfine Interactions in Magnetically Ordered Systems by NMR and Other Methods, University of L'Aquila, Italy, Sept. 11-15:

"Internal Fields and Iron Local Moment Formation in Molybdenum-Niobium Alloys" by R. D. Taylor, P-8, M. P. Maley and W. Gunning, both Rensselaer Polytechnic Institute, Troy, N.Y.

Twelfth International Thermal Conductivity Conference, Birmingham, Ala., Sept. 11-15:

"Thermal Conductivity of Sub-Stoichiometric ZrC" by E. K. Storms, CMB-3, and P. Wagner, N-7

Second International Conference on Ion Sources, Vienna, Austria, Sept. 11-16:

"Pre-Bunching in a Lamb-Shift Polarized Ion Source" by G. P. Lawrence, P-11, A. R. Koelle, H-4, J. L. McKibben, P-9, T. B. Clegg, University of North Carolina, Chapel Hill, and G. Roy, University of Alberta, Canada

"Observations and Calculations for a Duoplasmatron with Exact Pierce Extraction" by C. R. Emigh, P-DOR, and D. W. Mueller, MP-9

Regional Nurses Meeting, Espanola Hospital, N.M., Sept. 12: "Science and Society" by L. Rosen, MP-DO

Institute of Electrical and Electronic Engineers 1972 Computer Society Conference, San Francisco, Calif., Sept. 12-14:

"Analyzed Binary Computing" by N. Metropolis, C-DO (invited)

Second Conference of Applications of Chemistry to Nuclear Weapons Effects, Institute for Defense Analyses, Arlington, Va., Sept. 12-14:

"Calculations of Atmospheric lonization Produced by Sprint Bursts at Various Altitudes" by W. B. Maier II and C. D. Sutherland, both J-10

Lecture, Liberty Bell Corrosion Short Course 1972, Philadelphia, Penn., Sept. 12-14:

"Special Corrosion Problems in Nuclear Reactors for Rocket Propulsion" by M. G. Bowman, CMB-DO, E. K. Storms and T. C. Wallace, both CMB-3

American Nuclear Society National Topical Meeting on New Developments in Reactor Physics and Shielding, Kiamesha Lake, N.Y., Sept. 12-15:

"Effects of Photon Emission Anisotropy on Transport Calculations" by D. J. Dudziak and G. E. Bosler, both T-1

"Development of ENDF/B Shielding Data, Processing Codes, and Integral Tests" by R. J. LaBauve, R. E. Seamon, C. R. Weisbin, D. R. Harris and D. W. Muir, all T-2

"Sensitivity of Calculated Pulsed Sphere Spectra and Neutron Age to Carbon Cross Sections" by C. R. Weisbin, R. E. Seamon, D. R. Harris, Leona Stewart, R. J. LaBauve, all T-2, and G. D. Turner, TD-6

Centre for Nuclear Physics, Saclay, France, Sept. 13:

"Calculation of Fission Barriers for Heavy and Superheavy Nuclei" by J. R. Nix, T-9

Fifth American Isotope Separator Symposium, Argonne National Laboratory, III., Sept. 14-15. "Possible Containment of Plutonium in On-Line Targets by Graphite Encapsulation" by S. J. Balestrini, CNC-11, K. V. Davidson, CMB-6, and L. Forman, P-16

"LASL Isotope Separator II" by B. J. Dropesky and G. M. Kelley, both CNC-11

Fourth International Conference on Magnet Technology, Brookhaven National Laboratory, Upton, Long Island, N.Y., Sept. 18-22:

"Three-D Magnetic Field Computations and Comparison with Measurements" by R. Christian, Purdue University, Lafayette, Ind., and H. F. Vogel, MP-7

"Computation of Magnetic End Fields, and Comparison with Measurement" by H. F. Vogel, MP-7, and R. J. Lari, Argone National Laboratory, III.

"A Study to Adapt a Weak Focusing Synchrotron to a Strong Focusing Proton Storage Ring" by R. T. Avery, A. A. Garren, J. T. Gunn, all Lawrence Berkeley Laboratory, Calif., R. R. Fullwood, formerly P-3, A. J. Lieber, P-11, and P. F. Meads, Jr., William M. Brobeck and Associates, Berkeley, Calif.

Rocky Mountain Section, Society for Applied Spectroscopy, Colorado Springs, Colo., Sept. 19:

"Fundamental Atomic Spectroscopy Research" by D. W. Steinhaus, CMB-1

Seminar on Nuclear Data and Neutronics of CTR Blankets, Seattle, Wash., Sept. 19-20:

"Lithium Cross Sections" by Leona Stewart, T-2

"A Tritium-Production Measurement with Application to Fusion Reactor Blanket Design" by D. W. Muir, T-2

Twentieth Conference on Remote Systems Technology, Idaho Falls, Idaho, Sept. 19-21:

"New System for Gamma Scanning Fuel Elements" by J. R. Phillips, G. R. Waterbury, G. H. Mottaz, and J. N. Quintana, all CMB-1

"Remotized Apparatus for Determining Oxygon in Irradiated

Reactor Fuels and Cladding Materials" by Carolyn S. MacDougall, M. E. Smith, and G. R. Waterbury, all CMB-1

"Improvements in Remote Metallography in Inert Atmospheres" by D. D. Jeffries, J. Fl. Bender, and K. A. Johnson, all CMB-11

Fourth International Conference on Magnetic Technology, Brookhaven National Laboratory, Upton, Long Island, N.Y., Sept. 19-22:

"An Algorithm for Eliminating the Duodecapole Component in Quadrupole Magnets" by W. V. Hassenzahl, MP-6

"Radiation-Hardened Magnets Using Mineral-Insulated Conductors" by A. Harvey, MP-6

"Magnetic Measurements on the LASL Prototype Magnet" by W. Dunwoody, J. Spencer, N. Tanaka, all MP-7, R. Rolfe, M. Thomason, both AWU with MP-7, and R. Stearns, visiting staff member in MP-7

"Spectrometer Design at LASL" by H. A. Thiessen, MP-7, and M. M. Klein, C-6

Seminar, Chemistry Department, Louisiana State University, New Orleans, Sept. 22:

"Measurements of Diatomic Dissociation Rates in Shock Waves" by W. D. Breshears, L-3 (invited)

Japan-U.S. Seminar on Laser Interaction with Matter, Kyoto, Japan, Sept. 24-29:

"High Energy Gas Lasers for Possible Fusion Applications" by K. Boyer, L-DO

Symposium on Electric Rocket Propulsion, Princeton University School of Engineering and Applied Science Centennial Celebration, N.J., Sept. 25-26:

"Lithium Plasma Jets" by D. B. Fradkin, N-7 (invited)

Seventh Intersociety Energy Conversion Engineering Conference, San Diego, Calif., Sept. 25-29:

"A New Method for Extracting Energy from 'Dry' Geothermal Reservoirs" by D. W. Brown, N-7, M. C. Smith, CMB-13, and R. M. Potter, CNC-4

"Experience in Handling, Transport and Storage of Liquid Hydrogen—The Recyclable Fuel" by J. R. Bartlit, F. J. Edeskuty, and K. D. Williamson, Jr., all P-8

"Design Study of a Pulsed High-Beta Fusion Reactor" by S. C. Burnett, W. R. Ellis, both P-15, T. Oliphant, P-18, and F. L. Ribe, P-DO

Seminar, Department of Materials Engineering, Mississippi State University, State College, Sept. 26:

"Ceramic Hot Pressing Mechanisms and Fabrication Procedures" by A. W. Nutt, WX-5 (invited)

Meeting of the Joint Technical Coordinating Group for Air Launched Non-Nuclear Ordnance Working Party for Explosives, Naval Postgraduate School, Monterey, Calif., Sept. 26-28:

"LASL Explosive Laser Program" by J. A. Sullivan and C. P. Robinson, both L-3 (invited)

Symposium on Photon and Particle Interactions with Surfaces in Space, Sixth ESLAB Symposium, Noordwijk, The Netherlands, Sept. 26-29:

"Low-Energy Electron Measurements and Spacecraft Potential: Vela 5" by M. D. Montgomery and S. J. Bame, both P-4

University of Wyoming, Laramie, Sept. 28:

"Carbon-13 NMR Spectroscopy of Hemes, Heme-Proteins, and Related Substances" by N. A. Matwiyoff, CNC-4 (invited)

Symposium on High Energy Phenomena on the Sun, National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md., Sept. 28-30:

"Radio Source Positions in Cosmic Ray Flares" by I. D. Palmer, P-4 (invited)

Trinity Section, American Nuclear Society Meeting, Santa Fe, Sept. 29:

"Geothermal Power" by M. C. Smith, CMB-13 (invited)



Culled from the Nov., 1952, files of the Santa Fe New Mexican by Robert Porton

### County Policemen?

Discussion around Los Alamos these days centers around the possibility of the County taking over the police department. Various candidates for political office are taking sides on the issue. Figures released by the county offices show an estimated \$40,000 available to the county commissioners for the purpose of salaries, supplies and other expenditures. The AEC budget estimate for 1953 to run the police department is \$206,000, while the amount used this fiscal year was \$194,000. Officers also receive benefits as government employees which, official sources say, would be unavailable to them should the county take over the operation. Most observers predict the police department will remain under AEC jurisdiction.

### Civil Defense Test Evacuation Planned

The Los Alamos Disaster and Defense Committee announced that a complete test evacuation will be held for local residents. James Maddy, AEC health and safety official who is chairman of the committee, stressed the importance of the test for future safety and the hope that all residents will take part. Agencies represented in the planning include the AEC, the Zia Company, the Medical Center, the County and the Los Alamos Scientific Laboratory. Civil Defense evacuation signs have been placed throughout the community to direct traffic over three different routes from the Hill. Further assistance to drivers will be broadcast over KRSN.

### A Truck for the Post Office

The Los Alamos Post Office is accepting bids for the storage and servicing of a one-ton U.S. Postal Service truck. Forms may be procured at the Post Office. The use of the vehicle will enable the Post Office to provide better service to Hill residents, according to the announcement from the postmaster.

### **Record Vote Turnout**

Approximately 80 percent of the County's registered voters went to the polls for the general election. The Atomic City's turnout ranked second in the state, topped only by Grant County with a hefty 83.6 per cent. In Los Alamos 4,531 voters out of 5,738 who were registered, made their choices. On the national scene, Dwight Eisenhower defeated Adlai Stevenson for the Presidency.

## what's doing

BIEN DICHO TOASTMASTERS CLUB: Luncheon meeting, 12:05 p.m., Mondays, South Mesa Cafeteria. For information call William Pracht, 672-1920.

SIERRA CLUB: Luncheon meeting at noon, first Tuesday of each month, South Mesa Cafeteria. For information call Brant Calkin, 455-2468, Santa Fe.

RIO GRANDE RIVER RUNNERS: Meetings at noon, second Friday of each month at South Mesa Cafeteria. For information call Jon Cross, 662-7521.

LOS ALAMOS SAILORS: Meetings at noon, South Mesa Cafeteria, first Friday of each month. For information call Dick Young, 662-3751.

SPORTS CAR CLUB DEL VALLE RIO GRANDE: Meetings, 7:30 p.m., Hospitality Room, Los Alamos National Bank, first Tuesday of each month. For information call Gerry Strickfadden, 672-3664 or Frank Clinard, 662-4951.

PUBLIC SWIMMING: High School Pool— Monday through Wednesday, 7:30 to 9:30 p.m.; Saturday and Sunday, 1 to 5 p.m. Adult swim club, Sunday, 7 to 9 p.m.

LOS ALAMOS VOLLEYBALL CLUB: Every Monday, Girls' Gym, Los Alamos High School, men—6-7:30 p.m., women—8-9:30 p.m. For information call Don Shepard, 662-7865.

NEWCOMERS CLUB: Nov. 22, 6:30 p.m., Fuller Lodge, election of officers and tasting night. For information call Linda Hertrich, 662-9355.

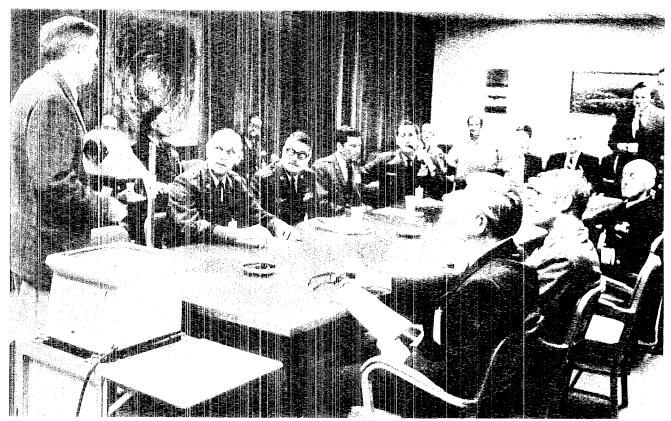
LOS ALAMOS CONCERT ASSOCIATION: Nov. 13, 8:15 p.m., Civic Auditorium, John Biggs Consort, baroque ensemble. For information call Marilyn Stevens, 662-4873.

MOUNTAIN MIXERS SQUARE DANCING CLUB: Mesa School, 8 p.m., For information call Ruth Maier, 662-3834. Nov. 4—Bones Craig, club caller Nov. 18—Dean Yount, Santa Fe

OUTDOOR ASSOCIATION: No charge, open to the public. Contact leaders for information.

Nov. 11—Stone Lions at Bandelier National Mounment Ed Kmetko, 662-7911 Nov. 23-26—Chiricahua Mountains, Ariz., Ken Ewing, 662-7488

MESA PUBLIC LIBRARY:
Nov. 1-28—Paralee Lester, paintings
Nov. 11-27—Los Alamos Arts Council
Crafts Fair of Northern New Mexico,
display
Nov. 15-Dec. 6—Los Alamos Geological
Society, display



LASI. Director Harold Agnew talks with representatives from the Military Liaison Committee, Department of Defense, Atomic Energy Commission and LASI. during the Military Liaison Committee's recent annual visit to the Laboratory. Seated at left of table are Major General John Appel, Army member of the MLC; USAF Major General J. L. Dickman, DOD; Major General William Evans and Brigadier General A. W. Braswell, Air Force members of the MLC. At right are John Erlewine, AEC deputy general manager; Carl Walske, chairman of the MLC; and Rear Admiral Robert Kaufman, Navy member of the MLC.

The LASL produced film "Computer Color Generations" won top awards in research and development competition in separate film festivals, one sponsored by the Information Film Producers of America Annual Awards Conference and the other by Industrial Photography, a national publication. Both sponsors will add the LASL film to their libraries for one year during which time it will be available for distribution to government, industrial and educational agencies and to both commercial and non-commercial television. Shown with the IFPA "CINDY" award are members of ISD-7 who were involved in the film's production. In foreground are Cameramen Billy Claybrook and Rob Gordon. At center is Mario Balibrera, the film's writer, director and editor. Technical advisors were Don Dickman, C-4; Dick Morse, T-7, and Paul Harper, C-DO. Industrial Photography's "INDY" was not available at the time this photograph was taken (Photo by Mitzie Ulibarri)

